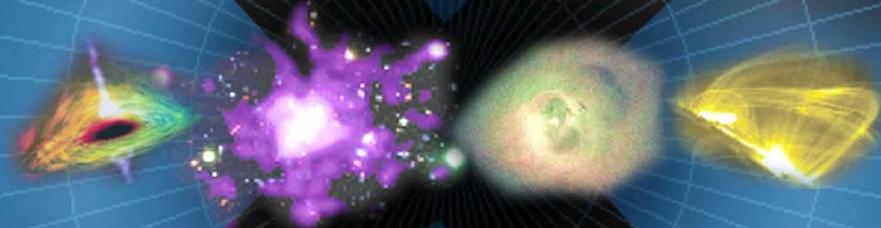


Constellation X

The Constellation X-Ray Mission



►► TES Development for the XMS

R. Kelley

Goddard Space Flight Center

FST - December 18-20, 2006

Agenda

Intro and Comments	R.L. Kelley	(< 5 min)
Progress at Goddard	C.A. Kilbourne	(12 min)
Progress at NIST	K.D. Irwin	(12 min)

Can we make the energy resolution even better at low energies?

Medium Energy array

Should have resolution of ~ 2.5 eV or better based on existing TES arrays

Low Energy array

Estimate energy resolution of LE array by scaling:

Keeping α fixed and reducing C by factor of 10 $\Rightarrow 0.8$ eV .

But excess noise depends on α , so to preserve E_{max} , lowering C further and reducing $\alpha \Rightarrow 0.7$ eV .

1 keV linear band $\Rightarrow 0.7$ eV

If we drop the linear bandwidth down to 0.6 keV, we don't need as much heat capacity:

$$\sqrt{0.6/1} * 0.7 \text{ eV} = 0.5 \text{ eV (FWHM)}$$

Probably can do this by making the TES thinner.

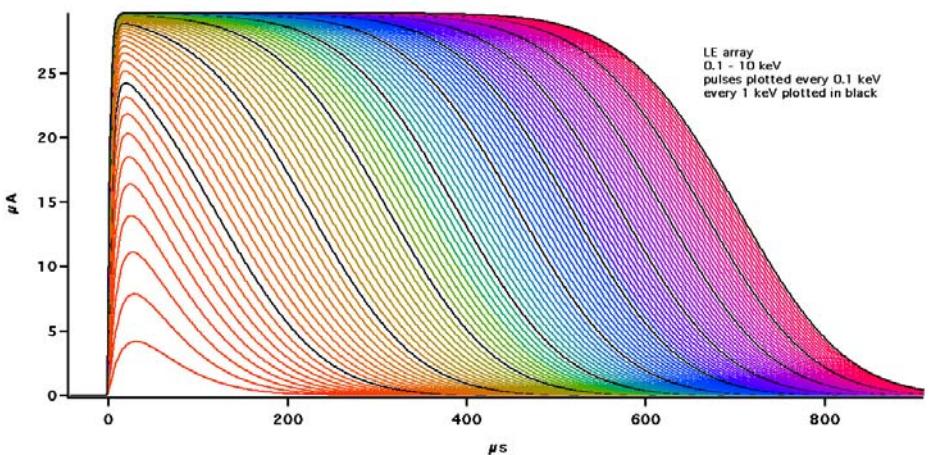
$$\Delta E \sim \sqrt{kT^2 C / \alpha} \quad R \sim T^\alpha$$

$$E_{max} = C \Delta T_{max}$$

$$\Delta T_{max} = T / \alpha \quad \text{for } dR/R = 1$$

$$E_{max} = C T / \alpha$$

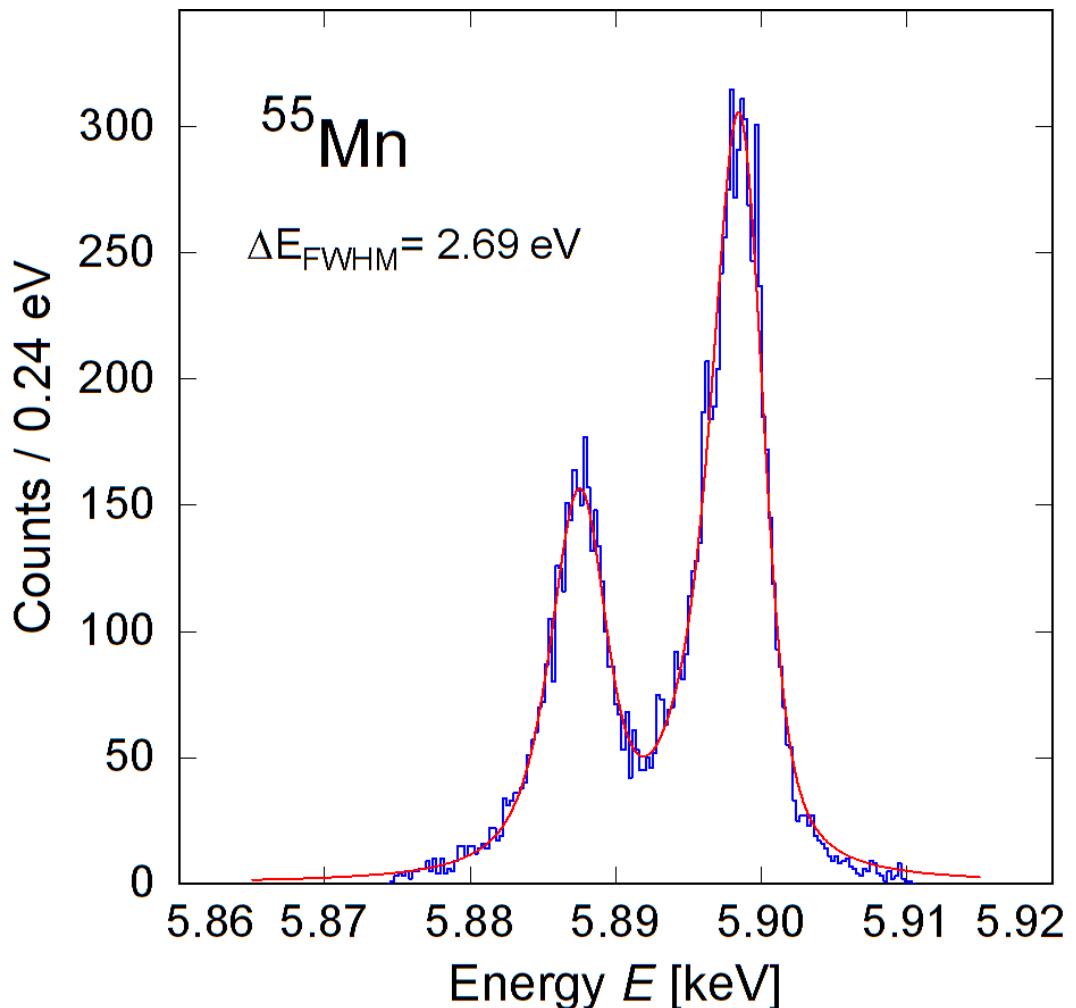
$$\Delta E \sim \sqrt{k T E_{max}}$$



Latest Results on Magnetic Calorimeters

Obtained ~ March 2006
50 μm diameter sensor
Gold absorber
 $\sim 200 \mu\text{m} \times 200 \mu\text{m} \times 4 \mu\text{m}$
Operated at 35 mK

University of Heidelberg
Brown University



Resolution history

